

The Nocturnal Bee Genus *Megaloptidia* (Hymenoptera: Halictidae)

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Abstract.—The nocturnal augochlorine bee genus *Megaloptidia* is revised and three species recognized; *Megaloptidia contradicta* (Cockerell), *M. nocturna* (Friese), and *M. saulensis* Engel and Brooks new species. The genus is newly diagnosed, distributional data given, and the male completely described for the first time. The first flower record for a species of this genus is given as *Dichorisandra ulei* (Commelinaceae). A lectotype and two paralectotypes are designated for *M. contradicta*. *Megalopta angusticeps* Friese is considered a junior synonym of *Megaloptidia nocturna* (new synonymy). *Megalopta pallitarsus* Friese, previously considered to be a species of *Megaloptidia*, is in fact a junior synonym of *Megommation insigne* (Smith) (new synonymy).

The neotropical halictine genus *Megaloptidia* Cockerell consists of three, rarely collected, nocturnal bees of the tribe Augochlorini. Individuals of *Megaloptidia* can be captured at lights during the night, however, aside from their nocturnal habit, the biology of *Megaloptidia* species remains unknown. One female of *Megaloptidia nocturna* (Friese 1926), however, has been collected at flowers of the monocotyledon *Dichorisandra ulei* (Commelinaceae). Members of *Dichorisandra* are nectarless and it is therefore believed that pollen is the only reward for floral visitors. *Dichorisandra* species possess poricidal anthers, suggesting "buzzing" as the means of freeing the pollen (i.e., the bee grasps the anther and buzzes its wings, thus translating the vibration to the anther and releasing the pollen through the apical pore). Most augochlorine species which have been studied are known to be buzz pollinators (e.g., Michener 1962, Rêgo and Albuquerque 1989, Renner 1989) and, in fact, the related *D. hexandra* is recorded to be buzz pollinated by the diurnal augochlorines *Augochloropsis* (*Paraugochloropsis*) *cupreola* (Cockerell 1900) and *Pseudaugochlora gra-*

minea (Fabricius 1804) (Sigrist and Sazima 1991). Within the Commelinaceae, *Dichorisandra* species are among the only ones to be open during the night (e.g., *D. hexandra* opens before dawn in southern Brazil) (Sigrist and Sazima 1991), making them suitable targets for nocturnal or crepuscular insects. Among related bee genera, floral associations are only known for *Megommation* (s. str.) (Moure 1943) which has been recorded at species of *Bauhinia* (Fabaceae) (Friese 1926) and *Ipomoeae* (Convolvulaceae) (Jørgensen 1912). There is nothing about the floral morphology of any of these plants which seems to readily explain the peculiarly modified mouthparts of these genera, which are extremely narrowed with a distinctly pointed galeal apex.

Megaloptidia was originally described by Cockerell (1900) as a subgenus of the common nocturnal augochlorine genus *Megalopta* Smith (1853) owing to its superficial similarity to this group. Cockerell distinguished his subgenus on the basis of wing venation. Moure (1958) redescribed the group, according it generic status for the first time, and recognized its affinity with

his genus *Megommation*. Eickwort (1969), in a revision of the genera and subgenera of Augochlorini, provided a more thorough description of the genus; however, he did not have the opportunity to examine the male terminalia thus the distal male sterna and genitalia remained undescribed. The genus is closely allied to the genera *Ariphanarthra* (Moure 1951), *Megommation* (s. lato), and *Micrommation* (Moure 1969). All of these genera share the distinctly narrowed labiomaxillary complex, pointed galeal apex, orthogonal epistomal sulcus, absence of the male labral distal process, narrow spiculum on the male eighth sternum, and the presence of a parapenial lobe in the male genitalia. The phylogenetic position of *Megaloptidia* will be further elaborated on in a forthcoming paper concerning the entire tribe (Engel in prep).

Herein we provide new descriptions for the genus and all included species. The male is thoroughly described for the first time and a key is presented for the identification of all three species.

MATERIAL AND METHODS

The following abbreviations are used for institutions where material used in this study is deposited: American Museum of Natural History, New York, New York, J.G. Rozen, Jr. (AMNH); Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, R.L. Davidson (CMNH); Field Museum of Natural History, Chicago, Illinois, P.P. Parrillo (FMNH); Cornell University Insect Collection, Ithaca, New York, J.K. Liebherr and E.R. Hoebeke (CUIC); Natural History Museum of Los Angeles County, Los Angeles, California, R.R. Snelling (LACM); Instituto de Investigación de Recursos Biológicos, Alexander von Humboldt, Santa Fé de Bogotá, Colombia, F. Fernández (UNCB); Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil (INPA); Museo de Invertebrados 'G.B. Fairchild', Universidad de Panamá, Estafeta Universitaria,

Panamá City, Panamá, D. Quintero (MIUP); Museu Entomologico de Universidade Federal de Viçosa, Viçosa, Minas Gerais, Brazil (UFVB); Museum für Naturkunde, Humboldt-Universität, Berlin, Germany, F. Koch, A. Kleine-Möllhoff (ZMHB); United States National Museum, Smithsonian Institution, Department of Entomology, Washington, D.C., R.J. McGinley (USNM); Division of Entomology, Natural History Museum, University of Kansas, Lawrence, Kansas, R.W. Brooks (SEMC); G.A.R. Melo collection (GARM); Philadelphia Academy of Natural Sciences, Philadelphia, Pennsylvania, D. Azuma (ANSP).

A total of 67 specimens of *Megaloptidia* were located and examined in the course of this study. All measurements were made using an ocular micrometer on a WILD-M5a microscope. The abbreviation "o.d." in the descriptions refers to "ocellar diameter" and relates the approximate length of setae to the diameter of the median ocellus. S1, T1, and F1 are given as abbreviations for first metasomal sternum, first metasomal tergum, and first flagellomere respectively.

Genus *Megaloptidia* Cockerell

Megalopta (*Megaloptidia*) Cockerell 1900: 373.

Type species: *Megalopta* (*Megaloptidia*) *contradicta* Cockerell 1900, by monotypy and original designation. Moure 1958: 180. Eickwort 1969: 442.

Diagnosis.—Individuals of *Megaloptidia* are robust bees which superficially resemble in general habitus species of the larger nocturnal genus *Megalopta* and the sole species of *Megommation* (s. str.). *Megaloptidia* differs from the former genus in the narrowed labiomaxillary complex, the serrate inner hind tibial spur, the irregular spacing of the distal hamuli, the narrow gena, the unmodified labral distal keel, the orthogonal epistomal sulcus, and the absence of lateral notches on the male S4. *Megommation* differs from *Megaloptidia* in the acute marginal cell apex, the deeply

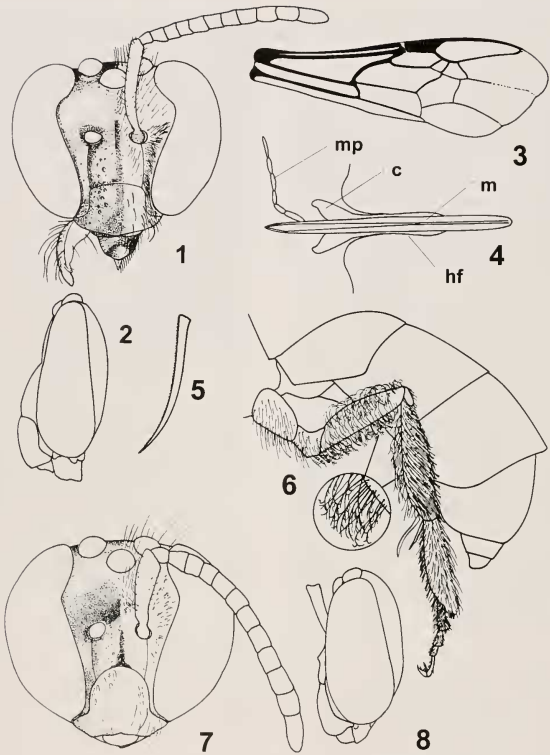
concave clypeal apex, the extremely short and weakly border basitibial plate, and the medioapical processes on the male S3-4.

Description.—The following description is based on all three included species. FE-MALE: Epistomal sulcus orthogonal. Clypeus and supraclypeal area strongly bowed, as in *Megommation* (Fig. 2). Malar space short. Mid-region of face gently sunken around antennal socket. Preoccipital ridge rounded. Inner orbit of compound eye strongly emarginate; eyes greatly enlarged, much broader than gena in profile (Figs. 2, 8, 14, 19); eye hairs short. Ocelli greatly enlarged (Figs. 1, 7, 13, 18), without impressed line running between lateral ocelli. Vertex extremely short, barely an ocellar diameter in length, usually less. Labral basal elevation orbicular, protuberant in profile, distal process narrowly triangular, labral teeth absent (Fig. 1). Mandible broad, subapical tooth well defined (Fig. 1). Hypostomal ridge carinate, not projecting beyond posterior margin of head, anterior angle rounded. Mouthparts greatly narrowed, approximately 10 times longer than wide (Fig. 4). Galeal base reaching to base of stipes, apex pointed, inner strip with setae; galeal comb absent; maxillary palp not greatly

lengthened. V-shaped brace of salivary plate absent; combined length of labial palp segments 2 and 3 shorter than 1. Pronotal lateral angle obtuse, not produced; lateral and dorsal ridges rounded. Mesoscutum broadly rounded anteriorly; mesoscutal lip low and rounded. Tegula rounded. Propodeal dorsal ridge rounded; lateral ridge carinate, ridges slightly divergent; propodeum slightly narrowed posteriorly; pit of posterior face narrow. Wing hairs long; apex of marginal cell truncate (Fig. 3). Anterior basitarsal brush present. Inner hind tibial spur serrate, serrations sharp (Fig. 5). Basitibial plate narrowly rounded, all borders well defined. Division of T5 narrow. MALE: As for the female with the following modifications. Antenna of moderate length, reaching to posterior border of mesoscutum; scape long; F2 shorter than F1; sensory plate areas present. Labral basal elevation absent; distal process absent. Gradulus of T7 absent. S4 with depression along posterior margin. S8 with posterior margin produced into a short, blunt median projection; spiculum narrow. Gonobasal bridge narrow; dorsal lobes strong. Dorsal gonostylus a long thin process. Basal process of gonostylus absent. Parapenial lobe present. Ventral prong of penis valve present.

KEY TO SPECIES OF MEGALOPTIDIA

1. Propodeal lateral surface strongly punctured, punctures almost contiguous; length of propodeal triangle approximately equal to that of metanotum; mesepisternum strongly and closely punctured, punctures separated by less than a puncture width, integument between smooth (excluding hypopimeron); mesoscutum punctured contiguously, integument between imbricate *M. contradicta* (Cockerell)
- Propodeal lateral surface imbricate with punctures separated by 2-3 puncture widths; length of propodeal triangle little to much greater than that of metanotum; sculpturing of mesepisternum and mesoscutum variable, but mesoscutum never strongly punctured 2
2. Labrum and clypeus amber; mesepisternum minutely punctured, punctures separated by 3-4 times puncture width, at least on posterior half, integument between smooth or imbricate (excluding hypopimeron); mesoscutum minutely punctured, punctures separated by 2-3 times puncture width; lateral ocellus almost touching compound eye, ocellular distance 0.25 o.d. in female (Fig. 1), 0.33 o.d. in male (Fig. 7); frontal line very weakly produced in profile in female (Fig. 2); median ocellus wider than interantennal distance in female (Fig. 1); scopal hairs of hind femur and tibia amber *M. nocturna* (Friese)



Figs. 1-8. *Megaloptidia nocturna* (Friese), 1-6 female, 7-8 male. 1, 2, head, front and side views respectively. 3, fore wing. 4, mouthparts excluding labium, ventral view, mp = maxillary palps, c = cardo, m = maxilla, hf = hypostomal fossa. 5, inner hind tibial spur. 6, hind leg and metasoma, side view, circle enlargement shows scopal hairs on S2 and S3. 7, 8, head, front and side views, respectively.

- Labrum and clypeus dark brown; mesepisternum closely and weakly punctured, punctures separated by less than a puncture width (excluding hypopimeron); mesoscutum punctured, punctures weak and separated by 2-3 puncture widths centrally, laterally becoming separated by less than a puncture width; lateral ocellus removed from compound eye 0.5 o.d. (Fig. 18); frontal line protuberant in profile (Fig. 19); median ocellus narrower than interantennal distance (Fig. 18); scopal hairs of hind tibia black (those of femur amber) *M. saulensis* n. sp.

***Megaloptidia contradicta* (Cockerell)**
(Figs. 13-17, 20)

Megalopta (Megaloptidia) contradicta Cockerell
1900: 373. Schrottky 1902: 407. Friese 1926:
124.

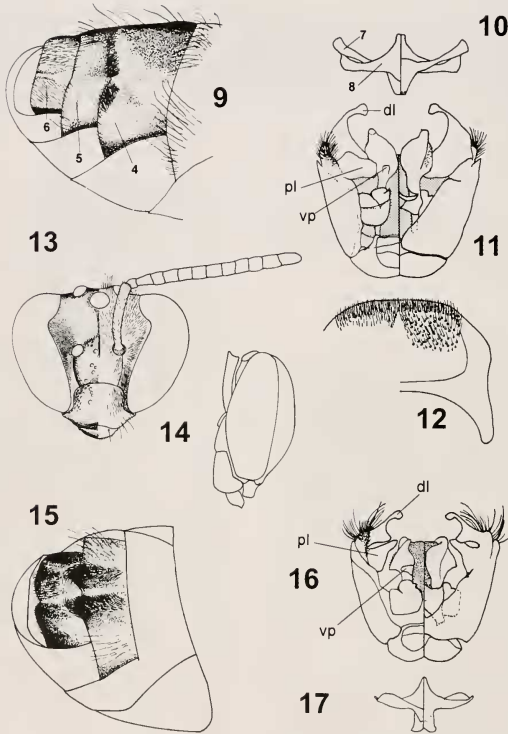
Megaloptidia contradicta (Cockerell); Moure 1958:
180.

Diagnosis.—Labrum and apical $\frac{3}{4}$ of clypeus amber. Mesoscutum closely and coarsely punctured, punctures separated by less than a puncture width, except over central disc punctures becoming weaker and separated by 1-3 times a puncture width. Mesepisternum closely punctured, punctures separated by less than a puncture width, integument between punctures smooth; hypopimeron smooth with a few widely spaced minute punctures. Scopal hairs of hind leg fuscous. Propodeal lateral surface strongly punctured, punctures nearly contiguous; length of propodeal triangle equal to that of metanotum. Only three specimens of this species were located, all from Cockerell's type series.

Description.—The following description is based on the lectotype. MALE: Total body length 11.3 mm; forewing length 8.6 mm. Head wider than long (Fig. 13). Distal margin of clypeus barely projecting below lower tangent of compound eye (Fig. 14); supraclypeal area wider than long, 0.59 times length of clypeus. Frontal line carinate from just below antennal sockets to just above sockets, ending at this point. Measurements of head of lectotype in mm: width 3.0; length (to apex of clypeus) 2.5; clypeal length 0.8; lower interorbital distance 0.9; upper interorbital distance 1.2;

interantennal distance 0.4; antennocelellar distance (to median ocellus) 0.6; between lateral ocelli 0.4; median ocellus to lateral ocellus 0.1; lateral ocellus to compound eye 0.16; prementum length 1.9, width 0.18. Scape reaching past lateral ocellus, length 1.1; pedicel slightly longer than wide, length 0.2, width 0.18; F1 longer than wide and longer than F2, length 0.26, width 0.2; F2 as long as wide, length-width 0.22; F3-9 each longer than wide, individual lengths 0.24, widths 0.22; F10 longer than wide and longer than immediately preceding flagellomeres, length 0.26, width 0.22; F11 longer than wide and longer than all previous flagellomeres, length 0.42, width 0.22. Median line strongly impressed; parapsidal lines weak. Intertegular distance 2.2. Propodeal triangle about as long as metanotum, much shorter than scutellum. Basal vein distad cu-a by 2.5 times vein width; 1r-m basad 1m-cu by vein width; 2r-m distad 2m-cu by 4.5 times vein width, 2r-m weakly curved. First submarginal cell longer than second and third combined; second narrowed anteriorly; anterior border of third along Rs almost 2 times as long as anterior border of second, posterior border of third 2 times longer than anterior border; marginal cell length 1.2, width 0.3. Distal hamuli arranged 3-1-1-3. S5 apically emarginate and bent ventrally (Fig. 15). S6 apically emarginate and mediolongitudinally concave (Fig. 15). Male terminalia as in figures 16 and 17.

Clypeus and supraclypeal area finely imbricate, with a few weak punctures separated by 1-3 puncture widths on lateral borders. Face minutely and closely punc-



Figs. 9-17. *Megaloptidia nocturna* (Fries), 9-12 male; *Megaloptidia contradicta* (Cockerell), 13-17 male. 9, metasoma, apical half, oblique view, numbers refer to sterna. 10, S7 and S8, dorsal view is right half and ventral view is left. 11, genital capsule, dorsal view is right half and ventral view is left, dl = dorsal gonostylar process, pl = parapenial lobe, vp = ventral prong of penis valve. 12, S6, ventral view. 13, 14, head, front and side views, respectively. 16, genital capsule, dorsal view is right half and ventral view is left. 17, S7 and S8, ventral view is right half and dorsal view is left.

tured, integument between imbricate. Vertex smooth and impunctate. Gena and postgena impunctate and finely imbricate. Pronotum finely imbricate. Mesoscutum closely and coarsely punctured, punctures separated by a puncture width or less, integument between punctures imbricate, medially punctures becoming weaker and more widely spaced, separated by 1-3 punctured widths. Scutellum with minute punctures separated by 1-2 puncture widths, integument between smooth. Metanotum sparsely and weakly nodulate, integument otherwise smooth. Preepisternum and mesepisternum closely punctured, punctures separated by a puncture width or less, integument between smooth. Hypoepimeron smooth, with a few minute punctures separated by 4-5 puncture widths. Metepisternum smooth. Propodeal triangle imbricate; lateral surface closely punctured, punctures separated by less than a puncture width; posterior surface smooth. Terga and sterna imbricate.

Head dark brown with a few weak blue-green highlights; labrum and apical three-quarters of clypeus amber; mandible dark brown; antennae brown. Mesosoma and metasoma dark brown; tegula amber and translucent along outer margins; legs dark brown, except amber on protarsus, apical four mesotarsomeres, and apical 2 metatarsomeres.

Pubescence generally pale or fuscous, fuscous hairs mostly on mesosoma and apical terga of metasoma. Scattered simple hairs (1 o.d.) on face, with suberect branched hairs (0.5 o.d.) along inner margins of compound eyes. Similar suberect and simple hairs on gena. Postgena with a few simple hairs (1.5-2 o.d.) on lateral and posterior borders. Hairs of face, gena, and postgena pale, those of vertex becoming fuscous. Pronotum with scattered simple hairs (1 o.d.) and laterally with extremely short, appressed branched hairs not obscuring the surface. Mesoscutum with scattered simple hairs (1 o.d.) and

shorter (less than 0.5 o.d.) branched hairs on lateral and posterior borders. Scutellum and metanotum with sparse simple hairs (1.5 o.d.). Pleura with scattered simple pale hairs (1-1.5 o.d.) and shorter (0.5 o.d. or less) suberect branched hairs. Hairs of forelegs pale or golden, outer margins with simple hairs (1-1.5 o.d.); mid legs with pale hairs except fuscous on basitarsus and outer margin of tibia, hairs simple, small tuft of closely packed hairs (1 o.d.) on inner basal margin of femur; hair of hind legs mostly fuscous, inner surface of basitarsus with stiff black hairs (1-1.5 o.d.). Terga with scattered simple hair (1-1.5 o.d.), becoming longer on lateral margins and more distal terga. Sterna with sparse simple hair (1-2.5 o.d.); hairs of S4 longest and concentrated on borders of apical depression and medially towards basal border; S5 with pair of apical submedian hair tufts (Fig. 15); hairs of S6 most numerous, more dense laterally (Fig. 15).

FEMALE: Unknown.

Type material.—BRAZIL: Pará: Lectotype #345, male, Benevides [1°22'S, 48°15'W], July (CMNH). Paralectotype, male, Santarem (CMNH). Paralectotype, male, Santarem, but lacking all metasomal segments except T1 and S1 and both antennae leaving only the scape, pedicel, F1 and F2 (ANSP).

Remarks.—In 1957 Padre Jesus S. Moure examined the material listed above and placed lectotype labels on the specimens, however, he failed to publish lectotype designations for this species. We now designate lectotype and paralectotypes for *Megaloptidia contradicta* using the same specimens. The lectotype specimen now bears a new label reading "LECTOTYPE: *Megalopta (Megaloptidia) contradicta* Cockerell, 1900; desig. M. Engel & R. Brooks", and the paralectotypes now have similar labels.

In Eickwort's (1969) study of the Augochlorini he referred to a male of *M. contradicta* (the paralectotype from ANSP des-

ignated above) along with a series of females he considered as possibly belonging to *M. contradicta*. This series of females from the AMNH are, in actuality, all of *M. nocturna*.

Megaloptidia nocturna (Friese)
(Figs. 1-12, 20)

Megalopta nocturna Friese 1926: 127.

Megalopta angusticeps Friese 1926: 127. **New synonymy.**

Megaloptidia nocturna (Friese); Moure and Hurd 1987: 242.

Megaloptidia angusticeps (Friese); Moure and Hurd 1987: 241.

Diagnosis.—Labrum and clypeus amber. Mesoscutum minutely punctured, punctures separated by 2-3 times a puncture width. Mesepisternum minutely punctured, otherwise integument smooth or imbricate; hypopimeron as on mesepisternum although punctures more widely spaced. Scopal hairs of hind femur and tibia amber. Propodeal lateral surface imbricate with punctures separated by 2-3 times a puncture width; length of propodeal triangle little to much greater than that of metanotum. This is the most common of the three species with 62 specimens examined during the course of this study.

Description.—The following description is based on Friese's holotypes. MALE: Total body length 13.3 mm; forewing length 8.3 mm. Head wider than long (Fig. 7). Distal margin of clypeus barely projecting below lower tangent of compound eye (Fig. 8); supraclypeal area wider than long, 0.68 times length of clypeus. Frontal line carinate from just below antennal sockets to just above sockets, ending with acute projection (Fig. 8). Measurements of head of holotype in mm: width 2.8; length (to apex of clypeus) 2.5; clypeal length 0.8; lower interorbital distance 0.8; upper interorbital distance 1.1; interantennal distance 0.3; antennocellar distance (to median ocellus) 0.5; between lateral ocelli 0.3; median ocellus to lateral ocellus 0.04;

lateral ocellus to compound eye 0.08; prementum length 2.1, width 0.2. Scape reaching past lateral ocellus, length 1.0; pedicel slightly longer than wide, length 0.2, width 0.18; F1 longer than wide and longer than F2, length 0.24, width 0.18 (Fig. 7); F2 as long as wide, length-width 0.2; F3 and F4 each longer than wide, individual lengths 0.22, widths 0.2; F5 longer than wide, length 0.24, width 0.2; F6 longer than wide, length 0.26, width 0.2; F7 and F8 longer than wide, individual lengths 0.28, widths 0.2; F9 and F10 longer than wide, individual lengths 0.3, widths 0.2; F11 longer than wide and longer than preceding flagellomeres, length 0.44, width 0.2. Median line strongly impressed; parapsidal lines weak. Intergular distance 1.8. Propodeal triangle longer than metanotum, slightly shorter than scutellum. Basal vein distad cu-a by vein width; 1r-m distad 1m-cu by 5 times vein width, intersecting second submarginal cell about half way through cell; 2r-m distad 2m-cu by 2 times vein width, 2r-m weakly curved. First submarginal cell longer than second and third combined; second narrowed anteriorly; anterior border of third along Rs about as long as anterior border of second, posterior border of third 2 times longer than anterior border; marginal cell length 2.5, width 0.5. Distal hamuli arranged 3-1-3. Male terminalia as in figures 10 and 11.

Clypeus and supraclypeal area finely imbricate, with a few weak punctures separated by 1-2 puncture widths on lateral borders. Face imbricate. Vertex smooth and impunctate. Gena sparsely and weakly nodulate, otherwise smooth. Postgena smooth. Pronotum smooth. Mesoscutum minutely punctured, punctures separated by 2-3 times puncture width, integument between punctures smooth and shining. Scutellum as on mesoscutum. Metanotum sparsely and weakly nodulate, integument otherwise smooth. Pre-episternum and mesepisternum minutely punctured, punctures separated by 3-4 times punc-

ture width, integument between smooth; hypopimeron as on mesepisternum except minute punctures separated by 4 times puncture width. Metepisternum smooth. Propodeal triangle imbricate; lateral surface imbricate, with punctures separated by 2-3 puncture widths; posterior surface smooth. Terga and sterna imbricate, except T1 which is smooth.

Head dark brown with strong metallic green highlights; labrum and clypeus amber; mandible amber except red at apex; antennae brown. Mesosoma dark brown with strong metallic green highlights, except pronotum light brown and without such highlights. Legs pale brown. Metasoma dark brown.

Pubescence golden. Scattered simple hairs (1-1.5 o.d.) on face, with suberect branched hairs (0.5 o.d.) along inner margins of compound eyes. Similar suberect and simple hairs on gena, branched hairs becoming longer towards postgena. Postgena with scattered branched hairs (2 o.d.). Pronotum with scattered simple hairs (1 o.d.) and laterally with extremely short, appressed hairs. Mesoscutum with scattered simple hairs (1 o.d.) and shorter (less than 0.5 o.d.) branched hairs on lateral and posterior borders. Scutellum and metanotum with sparse simple hairs (1.5-2 o.d.) and more numerous shorter simple hairs (0.5 o.d.). Pleura with scattered simple pale hairs (1-1.5 o.d.) and shorter (0.5 o.d. or less) suberect branched hairs; metepisternum without longer simple hairs. Pubescence of legs simple (1-2 o.d.) Terga with scattered simple hair (1 o.d.), becoming longer on lateral margins and apical terga. Sterna with sparse simple hair (0.5-1.5 o.d.); S4 with a few simple hairs (0.5 o.d.) concentrated on borders of apical depression (Fig. 9); hairs of S6 most numerous, laterally more dense than median area.

FEMALE: As for the male with the modifications indicated below. Measurements from female type of *M. angusticeps*. Total body length 12.2 mm; forewing

length 8.7 mm. Head as in figures 1 and 2. Supraclypeal area 0.8 times length of clypeus. Head width 3.0; length (to apex of clypeus) 2.7; clypeal length 0.8; lower interorbital distance 0.9; upper interorbital distance 1.1; interantennal distance 0.3; antennoocular distance (to median ocellus) 0.6; between lateral ocelli 0.3; median ocellus to lateral ocellus 0.04; lateral ocellus to compound eye 0.08; prementum length 2.2, width 0.2. Scape reaching past lateral ocellus, length 1.4; pedicel slightly longer than wide, length 0.2, width 0.18; F1 longer than wide and longer than F2, length 0.24, width 0.22; F2 wider than long, length 0.2, width 0.22; F3 and F4 each as long as wide, individual lengths-widths 0.22; F5 and F6 longer than wide, lengths 0.24, widths 0.22; F7 and F8 longer than wide, lengths 0.26, widths 0.22; F9 longer than wide, length 0.3, width 0.22; F10 longer than wide and longer than previous flagellomeres, length 0.44, width 0.22. Intertegular distance 2.1. Wing as in figure 3; basal vein distad cu-a by vein width; 1r-m confluent with 1m-cu; 2r-m distad 2m-cu by 5 times vein width, 2r-m weakly curved. First submarginal cell longer than second and third combined; second narrowed anteriorly; anterior border of third along Rs slightly longer than anterior border of second, posterior border of third 2 times longer than anterior border; marginal cell length 2.6, width 0.6. Distal hamuli arranged 3-1-3.

Mesoscutum minutely punctured, punctures separated by 3-4 times puncture width, integument between punctures weakly imbricate and shining. Terga and sterna weakly imbricate, except T1 which is smooth.

Head dark brown with strong metallic green highlights; labrum and clypeus amber; supraclypeal area light brown medially; mandible amber except black at apex. Mesoscutum, scutellum, metanotum and propodeum brown with strong metallic green highlights; pronotum and pleura amber with metallic green highlights

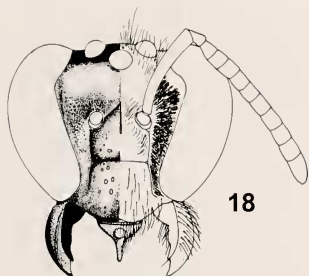
fainter than those of mesoscutum. Legs amber. Terga amber, except apical margins brown; sterna amber.

Pubescence golden. Scattered simple hairs (1–1.5 o.d.) on face. Gena and post-gena with branched hairs (1.5–2 o.d.). Pubescence of fore- and mid-legs as in male; hind legs with scopa formed of plumose hairs (2.5–3.5 o.d.) on trochanter, femur and inner margin of tibia. Terga with scattered simple hair (1–1.5 o.d.), becoming longer on lateral margins and apical terga. Sterna with sparse simple hair (1–1.5 o.d.).

Type material.—BRAZIL: Amazonas: Holotype, male, Faro, 23 January 1910, Ducke (ZMHB).

Additional material.—BRAZIL: Amazonas: 1 male, Parintins, 9 October 1919, Parish (FMNH). 1 male, Beruri, Rio Purus, 15 October 1991, G.A.R. Melo, sitting under leaf (GARM). 6 females, Hwy. BR 174, 86 km N Manaus, ZF6 km 9, 2°16'S, 59°56'W, 3 July 1986, M.V.B. Garcia, attracted to propane lantern at night (UFVB); 5 females, same except 4 July 1986 (UFVB); 2 females, same except (SEMC). 3 females, Reserva Ducke, 26 km NE Manaus, Itacoatiara Hwy., 12–23 May 1972, Munroe (SEMC). 2 males, Autaz-Mirim, Faz. São Lucas, 25 August 1994, João Vidal, malaise trap (INPA); 2 males, same except (SEMC); 1 male, same except 28 October 1994 (INPA). 1 female, Campus Universitario, Manaus, 7–24 September 1988, M. Castilho, J. Elias Bindo, Shannon trap, baited with feces (INPA). 2 females, Mun. Itacoatiara, Faz. Aruanã, AM010 km 215, 19–21 September 1990, C. Motta, R. Andrezza, R. Ferreira (INPA); 2 females, same except 18–19 September 1990, light trap (INPA). 1 female, Reserva Ducke, 9–22 September 1994, J. Rafael, J. Vidal, suspended malaise trap, 20 m (INPA). 1 female, Manaus, Campus Universitario, 21 June 1982, J. Rafael, malaise trap (INPA). 1 female, 26 km NE Manaus, Reserva Ducke, 6 October 1988, J. Raphael, suspended malaise trap, 10 m (INPA); 1 female, same except 9 May 1978, light trap,

J. Arias, N. Penny (INPA). 1 female, Rio Jau, Meriti, Mun. Novo Airão, 4–10 June 1994, J. Raphael (INPA). Pará: 4, females, Val de Cans. Belem., 20–21 November 1963, Oliveira, Wygodzinsky, at light (AMNH). 1 male, Baker (LACM). COLOMBIA: Dpto. Guaviare: 1 female, 1 male, Nukak Maku, Cerro Moyano, 200 m, 12 November 1995, malaise trap, F. Fernández (UNCB). ECUADOR: Sucumbios: 1 female, 0.5°S, 76.5°W, 290 m, Sacha Lodge, 13–23 June 1994, P. Hibbs, malaise trap (LACM). FRENCH GUIANA: 1 female (holotype of *Megaloptidia angusticeps*), Nouveau Chantier, Collection le Moul, June (ZMHB). 1 female, Saint-Laurent, du Maroni (AMNH). 1 female, Saül, 3°37'N, 53°12'W, 13–18 April 1983, S. Mori, ex: light trap (AMNH). 2 males, Roura, 18.4 km SSE, 240 m., 4°36'38"N, 52°13'25"W, 25–29 May 1997, J.S. Ashe and R.W. Brooks, FG1AB97-081, ex: flight intercept trap (SEMC). 1 male, Roura, 27.4 km SSE, 280 m., 4°44'20"N, 52°13'25"W, 23–24 May 1997, J.S. Ashe and R.W. Brooks, FG1AB97-022, ex: flight intercept trap (SEMC). 1 male, Roura, 27.4 km SSE, 280 m., 4°44'20"N, 52°13'25"W, 10 June 1997, J.S. Ashe and R.W. Brooks, FG1AB97-177, ex: flight intercept trap (SEMC). 1 male, Matoury, 41.5 km SSW on Hwy N2, 50 m., 4°37'22"N, 52°22'35"W, 29 May–9 June 1997, J.S. Ashe and R.W. Brooks, FG1AB97-170, ex: flight intercept trap (SEMC). GUYANA: Mazaruni-Potaro District: 1 female, Kartabo Point, 25–27 December 1983, W. Steiner, J. Byrd, J. Hill, F. Holtzclaw, malaise trap at edge of secondary forest and farmed field (USNM). PERU: Cuzco: 1 male, Quince Mil, 750 m, September 1962, L. Peña (CUIC). Huánuco: 1 female, Tingo Maria, 21 February 1972, J. Schuster, on flower of *Dichorisan-dra ulei*, 5:53am (CUIC). Madre de Diós: 1 male, Estación Pakitza, Reserva Manu, 18 June–4 July 1993, R. Cambra, T. Amorilla (MIUP). 1 female, Rio Tambopata Res., 30 air km SW Pto. Maldonado, 290 m, 16–20 November 1979, J. Heppner, subtropical



Figs. 18–19. *Megaloptidia saulensis* Engel & Brooks n. sp., 18, 19, female head, front and side views respectively.

moist forest (USNM). SURINAME: 3 females, Raleigh Vallen-Voltzberg Research Foengoe 4°43'N, 56°12'W, 26 January–15 February 1982, J. Carpenter, D. Trail (CUIC). VENEZUELA: Amazonas: 2 females, San Carlos de Río Negro, 1°56'N, 67°3'W, 6–12 December 1984, R. Brown (CUIC). 3 females, Camp IV, 0°58'N, 65°57'W, Cerro de la Neblina, 760 m, 15–18 March 1984, O.S. Flint, Jr., malaise trap over dry stream channel (USNM).

Flower records.—One female of *M. nocturna* has been collected on *Dichorisandra ulei* (Monocotyledonae: Commelinaceae), although there was no pollen in her scopa. This is the first floral association recorded for any species of *Megaloptidia*.

Variation.—As typical of nocturnal bees, *Megaloptidia nocturna* is lightly melanized throughout most of its Amazonian range. However, at the western edge of its distribution the male specimen from Colombia is light yellow brown and noticeably lighter than the brown Brazilian male specimens. This is odd since a female caught in the same trap on the same day is darker than the normal color of the Brazilian female specimens. The male specimen from Peru, Madre de Diós is almost

black and much darker than the Brazilian material.

Megaloptidia saulensis Engel and
Brooks, new species
(Figs. 18–20)

Diagnosis.—Labrum and clypeus dark brown. Mesoscutum weakly punctured, punctures separated by 2–3 times a puncture width over central disk, laterally punctures separated by less than a puncture width. Mesepisternum closely and weakly punctured, punctures separated by less than a puncture width; hypoepimeron with minute punctures separated by 2–3 times a puncture width. Scopal hairs of hind tibia black, those of femur amber. Propodeal lateral surface imbricate with punctures separated by 2–3 times a puncture width; length of propodeal triangle little to much greater than that of metanotum. This species is only known on the basis of two females.

Description.—The following description is based on the holotype. FEMALE: Total body length 12.4 mm; forewing length 8.8 mm. Head wider than long (Fig. 18). Distal third of clypeus projecting below lower tangent of compound eye (Figs. 18, 19);

supraclypeal area wider than long, 0.58 times length of clypeus. Frontal line carinate from below antennal sockets to just above sockets, ending with an acute projection and protuberant in profile (Fig. 19). Measurements of head of holotype in mm: width 3.4; length (to apex of clypeus) 2.8; clypeal length 1.0; lower interorbital distance 1.1; upper interorbital distance 1.4; interantennal distance 0.4; antennocellar distance (to median ocellus) 0.6; between lateral ocelli 0.4; median ocellus to lateral ocellus 0.08; lateral ocellus to compound eye 0.2 mm; prementum length 2.0, width 0.2. Scape reaching past lateral ocellus, length 1.5; pedicel slightly longer than wide, length 0.24, width 0.18; F1 longer than wide and longer than F2, length 0.26, width 0.22 (Fig. 18); F2 as long as wide, length-width 0.2; F3-6 each longer than wide, individual lengths 0.22, widths 0.2; F7 and F8 each longer than wide, individual lengths 0.24, widths 0.22; F9 longer than wide, individual lengths 0.26, widths 0.24; F10 longer than wide and longer than preceding flagellomeres, length 0.4, width 0.24. Median line strongly impressed; parapsidal lines weak. Intertegular distance 2.5. Propodeal triangle slightly longer than metanotum, about half length of scutellum. Basal vein distad of cu-a by vein width; 1r-m basad 1m-cu by vein width; 2r-m distad 2m-cu by 3 times vein width, 2r-m straight. First submarginal cell longer than second and third combined; second narrowed anteriorly; anterior border of third along Rs as long as anterior border of second, posterior border of third 2.5 times longer than anterior border; marginal cell length 2.4, width 0.6. Distal hamuli arranged 4-1-1-4.

Clypeus and supraclypeal area finely imbricate, with a few weak punctures separated by 1-2 puncture widths on lateral borders. Face imbricate with a few weak punctures along border with compound eye. Vertex, gena, and postgena smooth and impunctate. Pronotum weakly imbricate. Mesoscutum punctured, punctures

separated by 2-3 times puncture width, integument between punctures imbricate and shining, except laterally punctures separated by less than a puncture width. Scutellum with sparse, minute punctures, integument smooth. Metanotum sparsely and weakly nodulate, integument otherwise weakly imbricate. Pre-episternum and mesepisternum punctured, punctures separated by less than a puncture width, integument between smooth; hypoepimeron as on mesepisternum except minute punctures separated by 2-3 times puncture width. Metepisternum smooth with a few minute punctures sparsely scattered. Propodeal triangle imbricate; lateral surface imbricate with punctures separated by 2-3 puncture widths; posterior surface smooth. Terga and sterna imbricate.

Head dark brown with metallic blue-green highlights, except labrum, mandible, clypeus, supraclypeal area without such highlights. Mesosoma dark brown without highlights, except scutellum, metanotum, and propodeal triangle amber. Legs brown. Metasoma dark brown.

Pubescence pale to golden. Scattered simple hairs (1-1.5 o.d.) on face, with suberect branched hairs (0.5 o.d.) along inner margins of compound eyes. Similar simple hairs on gena, hairs becoming longer towards postgena; postgena with scattered simple hairs (2 o.d.). Pronotum with scattered simple hairs (1 o.d.) and laterally with extremely short, appressed hairs. Mesoscutum with scattered simple hairs (1 o.d.) and shorter (less than 0.5 o.d.) branched hairs on lateral and posterior borders. Scutellum with sparse simple hairs (1.5-2 o.d.) and more numerous shorter simple hairs (0.5 o.d.). Longer hairs of mesoscutum and scutellum fuscous. Metanotum with sparse simple hairs (1.5-2 o.d.). Pleura with scattered simple hairs (1-1.5 o.d.) and shorter (0.5 o.d. or less) suberect branched hairs; metepisternum with longer simple hairs more dense on ventral half; pubescence of pre-episternum fuscous, remainder pale. Pubescence



Fig. 20. Distribution of *Megaloptidia* species. Circles represent locality records for *M. nocturna* (Friese), squares for *M. contradicta* (Cockerell), and the single triangle for *M. saulensis* Engel & Brooks.

of legs simple and amber (1–2 o.d.), except tarsomeres 1 and 2 (of all legs), apex of protibia, and entirety of mesotibia and metatibia, including tibial scopa. Terga with scattered simple hairs (1 o.d.), becoming progressively longer on lateral margins and more distal terga. Sterna with sparse simple hairs (1.5–2.5 o.d.), most with a few branches.

MALE: Unknown.

Type material.—FRENCH GUIANA: Holotype, female, Saül, 3°37'N, 53°12'W, 1983, S. Mori, #158 (AMNH). 1 paratype female, Saül, 3°37'N, 53°12'W, 1983, S. Mori, #157 (AMNH).

Etymology.—The specific epithet is derived from the type locality of the species.

SPECIES MISTAKENLY PLACED IN MEGALOPTIDIA

Moure and Hurd (1987), in a catalog of the Western Hemisphere halictid bee spe-

cies, tentatively placed *Megalopta pallitarsus* Friese as a species of *Megaloptidia*. In actuality, examination of the holotype male for *M. pallitarsus* (ZMHB) reveals that this species is a junior synonym of *Megommation insigne* (Smith 1853). We therefore propose the following new synonymy:

Megommation insigne (Smith 1853)

Halictus insignis Smith 1853: 65.

Halictus cherazon Vachal 1904: 113.

Megalopta virgili Friese 1911: 454.

Megalopta (*Megaloptella*) *ipomoeae* Schrottky 1912: 271.

Megalopta pallitarsus Friese 1926: 125. **New synonymy.**

Megaloptidia pallitarsus (Friese); Moure and Hurd 1987: 242.

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LITERATURE CITED

- Cockerell, T. D. A. 1900. Descriptions of new bees collected by Mr. H.H. Smith in Brazil. I. *Proceedings of the Academy of Natural Sciences of Philadelphia* 52:356-377.
- Eickwort, G. C. 1969. A comparative morphological study and generic revision of the augochlorine bees (Hymenoptera: Halictidae). *University of Kansas Science Bulletin* 48:325-524.
- Fabricius, J. C. 1804. *Systema piezatorum secundum ordines, genera, species adiectis synonymis, locis, observationibus, descriptionibus*. Reichard, Brunsvigae, xiv+[15]-439, 1-30 pp.
- Friese, H. 1911. Neue Bienen aus Süd-Amerika (Hym.). *Deutsche Entomologische Zeitschrift* 1911: 453-456.
- Friese, H. 1926. Die Nachtbienen-Gattung *Megalopta* Sm. *Stettiner Entomologische Zeitung* 87:111-135.
- Jørgensen, P. 1912. Beitrag zur Biologie einiger südamerikanischer Bienen. *Zeitschrift für wissenschaftliche Insektenbiologie* 8:268-271.
- Michener, C. D. 1962. An interesting method of pollen collecting by bees from flowers with tubular anthers. *Revista de Biologia Tropical* 10:167-175.
- Moure, J. S. 1943. Notas sobre abelhas da coleção de Zikán (Hym. Apoidea). *Revista de Entomologia* 14: 447-484.
- Moure, J. S. 1951. *Ariphanarthra*, um novo gênero de Halictidae (Hymenopt.—Apoidea). *Dusenya* 2: 137-140.
- Moure, J. S. 1958. On the species of *Megalopta* described by F. Smith (Hymenoptera, Apoidea). *Journal of the New York Entomological Society* 66: 179-190.
- Moure, J. S. 1969. *Micrommaton*, novo gênero de Halictidae do Paraná (Hym. Apoidea). *Atas Sociedade de Biologia* 12:247-249.
- Moure, J. S., and P. D. Hurd, Jr. 1987. *An annotated catalog of the halictid bees of the Western Hemisphere (Hymenoptera: Halictidae)*. Smithsonian Institution Press, Washington, vii+405 pp.
- Rêgo, M. M. C., and P. M. C. de Albuquerque. 1989. Comportamento das abelhas visitantes de *Murici*, *Byrsonima crassifolia* (L.) Kunth, Malpighiaceae. *Boletim do Museu Paraense Emílio Goeldi, Zoologia* 5: 179-194.
- Renner, S. S. 1989. Floral biological observations in *Heliamphora tatei* (Sarraceniaceae) and other plants from Cerro de la Neblina in Venezuela. *Plant Systematics and Evolution* 163:21-30.
- Schrottky, C. 1902. Ensaio sobre as abelhas solitárias do Brasil. *Revista do Museu Paulista* 5:330-613.
- Schrottky, C. 1912. Beschreibung von *Megalopta* (*Megaloptella*) *ipomocae* n. sp. *Zeitschrift für Wissenschaftlichen Insektenbiologie* 8:271-272.
- Sigrist, M. R., and M. Sazima. 1991. Biologia floral e polinização por vibração em duas espécies simpátricas de *Dichorisandra* (Commelinaceae). *XLII Congresso Nacional da Sociedade Botânica do Brasil, Sociedade Botânica do Brasil, Universidade Federal de Goiás* 1991:484.
- Smith, F. 1853. *Catalogue of hymenopterous insects in the collection of the British Museum, part I: Andrenidae and Apidae*. British Museum, London, 197 pp., 6 pls.
- Vachal, J. 1904. Étude sur les *Halictus* d'Amérique (Hym.). *Miscellanea Entomologica* 12:9-24, 113-128, 137-144.